

panied by his brother, Dr. Ball, *October 13. 1665.* at fix of the Clock, at *Mainhead* near *Exeter* in *Devonshire*, with a very good *Telescope* near 38 foot long, and a double Eye-glass, as the observer himself takes notice, adding, that he never saw that *Planet* more distinct. The observation is represented by *Figure 3.* concerning which, the Author saith in his letter to a friend, as follows; This appear'd to me the present figure of *Saturn*, somewhat otherwise, than I expected, thinking it would have been decreasing, but I found it full as ever, and a little hollow above and below. Whereupon the Person, to whom notice was sent hereof, examining this shape, hath by Letters desired the worthy Author of the *Systeme of this Planet*, that he would now attentively consider the present *Figure* of his *Anses* or *Ring*, to see whether the appearance be to him, as in this *Figure*, and consequently whether he there meets with nothing, that may make him think, that it is not *one* body of a Circular *Figure*, that embraces his *Diske*, but *two*.

And to the end that other Curious men, in other places might be engaged, to joyn their Observations with him, to see, whether they can find the like appearance to that, represented here, especially such Notches or Hollowneesses, as at A and B, it was thought fit to insert here the newly related Account.

A Relation of some Mercurial Observations; and their Results.

Modern *Philosophers*, to avoyd Circumlocutions, call that Instrument, wherein a Cylinder of Quicksilver, of between 28. and 31. Inches in Altitude, is kept suspended after the manner of the *Torricellian* Experiment; a *Barometer* or *Baroscope*, first made publick by that Noble Searcher of Nature. Mr. Boyle, and imployed by Him and others, to detect all the minut variations in the Pressure and weight of the Air. For the more
curious

curious and nice distinguishing of which small changes, Mr. *Hook* in the *Preface* to his *Micrography*, has described such an Instrument with a *Wheel*, contrived by himself, and, by these two last years trials of it, constantly found most exact for that purpose: which being so accurate, and not difficult to be made, it were desirable, that those who have a Genius and opportunities of making Observations of this kind, would furnish themselves with such of these Instruments, as were exactly made and adjusted according to the Method, delivered in the newly mentioned place.

To say something of the Observations, made by this Instrument, and withal to excite studious *Naturalists* to a sedulous prosecution of the same, the *Reader* may first take notice, that the lately named Mr. *Boyle* hath (as himself not long since did intimate to the Author of these *Traacts*) already made divers Observations of this kind in the year 1659. and 1660. before any others were publick, or by him so much as heard of; though he has hitherto forbore to divulge them, because of some other Papers (in whose Company they were to appear) which being hindred by other studies and employments, he hath not as yet finished.

Next, that, besides several others, who, since have had the curiosity of making such observations, the Worthy and Inquisitive Dr. *John Beal*, is doing his part with much assiduity (of which he hath by several Letters acquainted his Friends in *London*) both by observing himself, and by procuring many Correspondents in several places in *England* for the same purpose; judging it of great importance, that Observations of this kind be made in parts somewhat distant from one another, that so from many of those, accurately made and then compared, it may be discovered, whether the Aire gravitates more in the parts of the Earth lying more *East* or *West*, *North* or *South*? whether on such as lie neerer to the *Sea*, or further up into the *Mainland*? in hotter or colder weather? whether in high

high Winds or Calms? whether in wet weather or dry? whether most when a North, or when a South, when an East or a West wind blows? and whether it keeps the same seasons of Changes? and whether the seasons and changes of the Air and Weather can be thereby discover'd, and the now hidden causes of many other *Phænomena* detected?

The said *Doctor* is so much pleas'd with the discovery already made by the help of this Instrument, that he thinks it to be one of the most wonderful that ever was in the World, if we speak of strangeness, and just wonder, and of Philosophical importance, separate from the interest of lucre. For (*said he, in one of his Letters*) who could ever expect, that we men should find an Art, to weigh all the Air that hangs over our heads, in all the changes of it, and, as it were, to weigh, and to distinguish by weight, the Winds and the Clouds? Or, who did believe, that by palpable evidence we should be able to prove, the *ferrenest* Air to be most heavy, and the *thickest* Air, and when darkeſt Clouds hang neereſt to us, ready to dissolve, or dropping, *then* to be lightest. And though (*so he goes on*) we cannot yet reach to all the Uses and Applications of it; yet we should be entertain'd for a while, by the truly Honourable Mr. Boyle, as the leading person herein, upon the delight and wonder. The Magnet was known many hundreds of years before it was apply'd to find out *New Worlds*. To me (*said he*) tis a wonderful delight, that I have alwaies in my Study before my eye such a *Curious Ballance*.

Having thus in *General* expressed his thoughts about this Invention, and the singular pleasure, he takes in the Observations made therewith, he descends to particulars, and in several Letters communicates them to his Correspondent, as follows:

1. My *Wheel-bareometer* I could never fill so exactly with *Mercury*, as to exclude all Airs and therefore I trust more

The Exclusion of all Air is here necessary, because Air being subject to the operation of Heat and Cold, if any of it remain in the Barometer, it will cause it to vary from shewing the true Pressure of the Air.

to a *Mercurial Cane*, and take all my Notes from it, This Cane is but 35. Inches long, of a very slender Cavity, and thick Glafs. This may easily be conveyed to any place, for Trials. The Vessel for the stagnating *Mercury*, into which the said Cane is immersed, is about two Inches wide. The *Mercury* so well fill'd, that for some daies it would not subside, but hung to the top of the Glafs-cane. I keep it in a Closet pretty close, 9. foot high, 8. foot broad, 15. foot long; neer a Window. This I note, because possibly the closeness of the room may hinder, that it gives not the full of all Changes, as it might in a more passable Air.

2. In all my Observations from *May 28. 1664* to this present (*December 9. 1665.*) the *Quicksilver* never ascended but very little above $30\frac{1}{4}$ Inches.

3. It ascended very seldom so high (*videl.* to $30\frac{1}{4}$ Inches) chiefly in *Decemb. 13. 1664.* the weather being fickle-fair, Evening.

4. I find by my *Calender* of *June 22. 1664.* at 5. in the Morning, in a time of long settled fair weather, that the *Mercury* had ascended about half an Inch higher then 30: but I fear some mistake, because I then took no impression of wonder at it; yet for 3. or 4. daies, at that time it continued high, in well-settled, fair and warm weather; most part above 30. Inches. So that I may note, the *Mercury* to rise as high in the hottest Summer, as in the coldest Winter-weather.

5. Yet surely I have noted it ascend a little higher for the Coldness of the Weather; and very frequently, both in Winter

*Perhaps this is from
some included Air,*

ter and Summer to be higher in the cold Mornings and evenings, then in the warmer Mid day.

6. Generally in settled and fair weather both of Winter and Summer, the *Mercury* is higher, than a little *before* or *after*, or *in* Rainy weather.

7. Again, generally it descended lower after Rain, than it was before Rain.

8. Generally also it falls in great winds; and somewhat it seem'd to sink, when I open'd a wide door to it, to let in stormy winds; yet I have found it to continue very high, in a long stormy wind of 3. or 4. daies.
*It seems these were
Easterly winds.*

9. Again, generally it is higher in an *East* and *North*-wind. (*Cæteris paribus*) than in a *South* and *West*-wind.

10. I tryed several times, by strong fumes and thick smoaks to alter the Air in my Closet; but I cannot affirm, that the *Mercury* yielded any more, then might be expected from some increase of heat. Such as have exact *Wheel-Barometers*, may try whether Odors or Fumes do alleviate the Air.

11. In this Closet I have not in all this time found the extreme changes of the *Quicksilver* to amount to more, than to $2\frac{1}{4}$, or to $2\frac{7}{8}$. inches, at most.

12. Very often I have found great changes in the Air, without any perceptible change in the *Barometer*; as in the dewy nights, when the moisture descends in a great quantity, and the thickness sometimes seems to hide the Stars from us: In the days foregoing and following, the Vapors have been

drawn up so *Invisibly*, that the Air and Sky seem'd very clear all day long. This I account a great change between ascending and descending Dews and Vapors (which import Levity and Weight,) and between thick Air and clear Air: which changes do sometimes continue in the Alternative course of day and night, for a week or fortnight together; and yet the *Baroscope* holding the same.

13. Sometimes (I say not often) the *Baroscope* yields not to other very great changes of the Air. As lately (*December 18.*) an extraordinary bright and clear day; and the next following quite darkned, some Rain and Snow falling; but the *Mercury* the same: so in high winds and calms the same.

14. I do conceive, that such as converse much *Sub dio*, and walk much abroad, may find many particulars much more exactly, then I, who have no leisure for it, can undertake. To instance in one of many, *December. 16.* last, was a clear cold day, very sharp and strong *East* wind, the *Mercury* very near 30. inches high, about three in the afternoon, I saw a large black cloud, drawing near us from the *East* and *South-East*, with the *East-wind*. The *Mercury* changed not that day nor the day following; the Stars and most of the sky were very bright and clear till Nine of the Clock; and then suddenly all the sky was darkned, yet no change of weather happened; *December 17.* the frost held, and 'twas a clear day, till about two of the clock in the afternoon; and then many thick clouds appear'd low in the *West*; yet no change of the weather here; the Wind, Frost, and Quick-silver, the same, *December 18.* the *Mercury* fell almost $\frac{1}{4}$ of an inch, and the sky and Air so clear and bright and cold with an *East-wind*, that I wondred what could cause the *Mercury* to descend. I Expected, it should have ascended, as usually it does in such clear skies. Casually I sent my servant abroad, and he discovered the remote Hills, about 20. miles off, cover'd with snow

snow, This seem'd to manifest, that the Air, being discharged of the clouds by snow, became lighter.

15. I have seldom seen the change to be very great, at any one time. For, though I do not now take a deliberate view of my Notes, yet I wonder'd once to see, that in one day it subsided about $\frac{3}{4}$ of an inch.

16. Of late I have altered my Method upon the *Barometer*, observing it, as it is before my Eyes, all day long, and much of the night, being watchful for the moments of every particular change, to examine, what cause in the Air and Heavens may appear for such changes. And now my wonder is, to see, how slow it is, it holding most between the nine and twentieth and thirtieth inch of late.

17. I must now (*January 13. 1666 $\frac{1}{6}$*) tell you, that the *Mercury* stands at this time (as it did also yesterday) a quarter above 30. inches; yet both days very dark and cloudy, sometimes very thick and misty Air; which seldom falls out. For, for the most part, I see it higher in clearest settled weather, than in such cloudy and misty Foggs. This thick Air and darkness hath lasted above a week; lately more Cold, and East and North-East wind.

Thus far the Notes of this Observing *Divine*; of which Mr. Boyle, to whom they were also communicated, entertains these thoughts, that they seem to him very faithfully made, and do for the main, agree well enough with his observations, as far as he remembers, not having them, it seems, at that time, when he wrote this, at hand; and though it be wished by him,

This seems to be wished, because the motion of the Mercury may be more free in a wider Cane.

that the Observer's Glafs-Cane had been somewhat bigger; yet his diligence in fitting it so carefully, or rather so skilfully, as is above-mentioned, is much by him commended.

Some